What is claim d is:

1. A thin-film solar cell comprising a set of a transparent conductive layer and a photoelectric conversion layer laminated in this order on a substrate,

wherein the photoelectric conversion layer is made of a p-i-n junction, an i-layer constituting the p-i-n junction is made of a crystalline layer and

the transparent conductive layer is provided with a plurality of holes at its surface of the side of the photoelectric conversion layer, each of said holes having irregularities formed on its surface.

2. A thin-film solar cell claimed in Claim 1, wherein a plurality of holes are formed on the surface of the substrate, each of said holes having irregularities formed on its surface.

3. A thin-film solar cell claimed in Claim 1, wherein a diameter of each hole formed on the surface of the transparent conductive layer is in the range of 200 nm to 2000 nm, the depth of each hole is in the range of 50 nm to 1200 nm and a difference in height between each irregularity formed on the surface of the hole is in the range of 10 nm to 300 nm.

4. A thin-film solar cell claimed in Claim 1, wherein irregularities are formed on the surface other than the holes of the transparent conductive layer on which the holes are provided, and a difference in height between each irregularity is in the range of 10 nm to 300 nm.

5. A thin-film solar cell claimed in Claim 1, wherein the transparent conductive layer is made mainly of zinc oxide.

6. A thin-film solar cell claimed in Claim 1, wherein the i-layer constituting the photoelectric conversion layer includes silicon or silicon alloy.

7. A thin-film solar cell claimed in Claim 1, wherein the ratio I_{220}/I_{111} of the integral intensity of (220) X-ray diffraction to the integral intensity of (111) X-ray diffraction of the i-layer is 5 or more.

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8 A thin-film solar cell claimed in Claim 1, wherein the transparent conductive layer is oriented with respect to the substrate surface.

9. A method for manufacturing a thin-film solar cell characterized in that a surface of a substrate and/or a first transparent conductive layer is etched for forming a plurality of holes on the surface of the first transparent conductive layer upon manufacturing a thin-film solar cell claimed in Claim 1.

10. A method for manufacturing a thin-film solar cell characterized in that a first transparent conductive layer is formed so as to have holes on its surface, whereby a plurality of holes are provided on the surface of the first transparent conductive layer upon manufacturing a thin-film solar cell claimed in Claim 1.

11. A thin-film solar cell comprising two or more sets of a transparent conductive layer and a photoelectric conversion layer laminated in this order on a substrate,

wherein a plurality of holes are provided on a surface at a side of a first photoelectric conversion layer of a first transparent conductive layer that is the closest layer to the substrate as well as on a surface at

a side of a second photoelectric conversion layer of a second transparent conductive layer formed on the first transparent conductive layer, each of said holes having irregularities formed on its surface,

the photoelectric conversion layer is made of a p-i-n junction, an i-layer constituting the p-i-n junction of the first photoelectric conversion layer is made of an amorphous or a crystalline layer and the i-layer of each of the other photoelectric conversion layers is made of a crystalline layer.

12. A thin-film solar cell claimed in Claim 11, wherein a plurality of holes are formed on the surface of the substrate, each of said holes having irregularities formed on its surface.

13. A thin-film solar cell claimed in Claim 11, wherein a diameter of each hole formed on the surface of the first and second transparent conductive layer is in the range of 200 nm to 2000 nm, the depth of each hole is in the range of 50 nm to 1200 nm and a difference in height between each irregularity formed on the surface of the hole is in the range of 10 nm to 300 nm.

14. A thin-film solar cell claimed in Claim 11, wherein a difference in height between each irregularity formed on the surface of each hole provided on the surface of the second transparent conductive layer is smaller that that formed on the surface of each hole provided on the surface of the first transparent conductive layer.

15. A thin-film solar cell claimed in Claim 11, wherein irregularities are formed on the surface other than the holes of the second transparent conductive layer on which the holes are provided, and a difference in height between each irregularity is in the range of 10 nm to

300 nm.

16. A thin-film solar cell claimed in Claim 11, wherein the transparent conductive layer is made mainly of zinc oxide.

17. A thin-film solar cell claimed in Claim 11, wherein the thickness of the photoelectric conversion layer including the amorphous i-layer is first to four times as large as the average height difference between each irregularity formed on the surface of each hole provided on the first transparent conductive layer.

18. A thin-film solar cell claimed in Claim 11, wherein the i-layer constituting the photoelectric conversion layer includes silicon or silicon alloy.

19. A thin-film solar cell claimed in Claim 11, wherein the ratio I_{220}/I_{111} of the integral intensity of (220) X-ray diffraction to the integral intensity of (111) X-ray diffraction of the crystalline i-layer is 5 or more.

20. A thin-film solar cell claimed in Claim 11, wherein the first transparent conductive layer is oriented with respect to the substrate surface.

21. A method for manufacturing a thin-film solar cell characterized in that a surface of a substrate and/or a first transparent conductive layer and/or a second transparent conductive layer is etched for forming a plurality of holes on the surface of the first transparent conductive layer and on the surface of a second transparent conductive layer upon manufacturing a thin-film solar cell claimed in Claim 11.

22. A method for manufacturing a thin-film solar cell characterized in that a first transparent conductive layer and/or a second transparent conductive layer is formed so as to have holes on its surface, whereby a plurality of holes are provided on the surface of the first transparent conductive layer and on the surface of a second transparent conductive layer upon manufacturing a thin-film solar cell claimed in Claim 11.

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